YAZAKI

OPERATING INSTRUCTIONS

WFC-SC10, 20, 30
WFC-SH10, 20, 30

Aroace

WATER FIRED SINGLE-EFFECT ABSORPTION CHILLER AND CHILLER-HEATER

This product is a water fired absorption unit which provides chilled water for cooling or hot water for heating in central plant type air conditioning systems. Units with nominal refrigeration capacities of 10, 20, and 30 tons are complete with operating and safety controls. The absorption chiller or chiller-heater is energized by a heat medium (hot water) at 158°F to 203°F from a process, cogeneration, solar or other waste heat source.

When this equipment is applied correctly, installed in accordance with Yazaki INSTALLATION INSTRUCTIONS and properly maintained, it will provide many years of trouble free operation.

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GENERAL

These instructions are intended to acquaint the Owner/End User with the operation and general maintenance requirements of Yazaki Water Fired Single-Effect Absorption Chiller or Chiller-Heater units.

Please read ALL instructions carefully and observe precautions. Failure to operate and maintain this equipment in accordance with the OPERATING INSTRUCTIONS may affect the equipment performace and product Warranty.

If the equipment does not operate as expected, check the Troubleshooting Guide in these instructions BEFORE calling your Authorized Yazaki Service Provider. This approach will not only save cost but also avoid any unnecessary downtime.

ABSORPTION PRINCIPLE

Yazaki absorption chillers or chiller-heaters use a solution of lithium bromide and water, under a vacuum, as the working fluid. Water is the refrigerant and lithium bromide is the absorbent. During cooling operation, refrigerant liquid boils under the influence of a deep vacuum in the evaporator and creates a refrigerating effect which removes heat from the chilled water circuit. The single-effect absorption cycle has one generator heated by an external source of hot water, a condenser, evaporator and absorber. The absorber and condenser are water cooled and heat is normally rejected through a cooling tower.

COOLING OPERATION

Generator

When the heat medium inlet temperature exceeds 154.4°F (203°F max.) the solution pump forces dilute lithium bromide solution into the generator. The solution boils vigorously under a vacuum and droplets of concentrated solution are carried with refrigerant vapor to the primary separator. After separation, refrigerant vapor flows to the condenser and concentrated solution is precooled in the heat exchanger before flowing to the absorber.

Condenser

In the condenser, refrigerant vapor is condensed on the surface of the cooling coil and latent heat, removed by the cooling water, is rejected to a cooling tower. Refrigerant liquid accumulates in the condenser and then passes through an orifice into the evaporator.

Evaporator

In the evaporator, the refrigerant liquid is exposed to a substantially deeper vacuum than in the condenser due to the influence of the absorber. As refrigerant liquid flows over the surface of the evaporator coil it boils and removes heat, equivalent to the latent heat of the refrigerant, from the chilled water circuit. The recirculating chilled water is cooled to 44.6°F and the refrigerant vapor is attracted to the absorber.

Absorber

A deep vacuum in the absorber is maintained by the affinity of the concentrated solution from the generator with the refrigerant vapor formed in the evaporator. The refrigerant vapor is absorbed by concentrated lithium bromide solution flowing across the surface of the absorber coil. Heat of condensation and dilution are removed by the cooling water and rejected through a cooling tower. The resulting dilute solution is preheated in the heat exchanger before returning to the generator where the cycle is repeated.

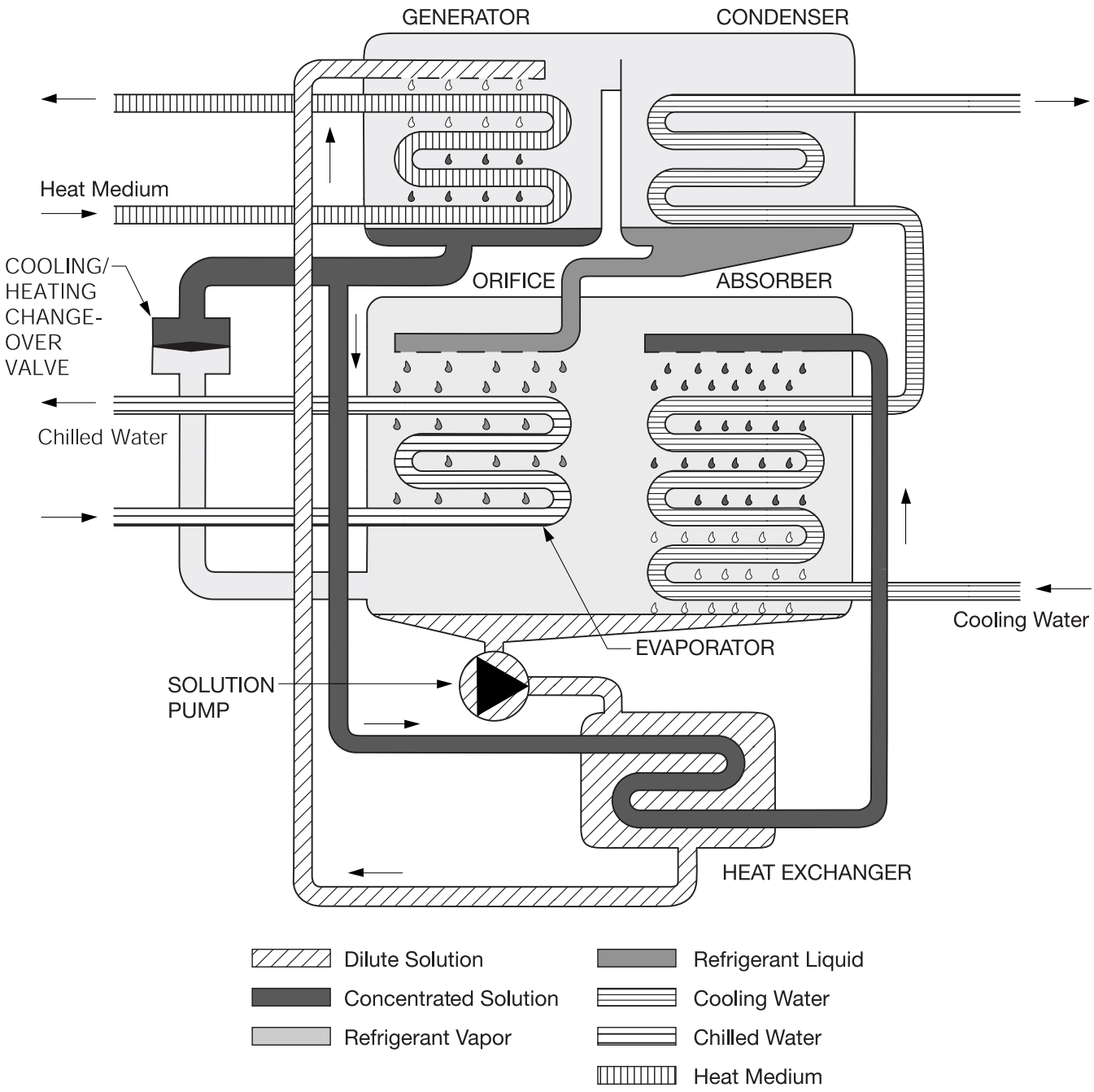


Fig.1 SINGLE-EFFECT ABSORPTION CYCLE (COOLING)

HEATING OPERATION

Generator

When the heat medium inlet temperature exceeds 154.4°F (203°F max.) the solution pump forces dilute lithium bromide solution into the generator. The solution boils vigorously under a vacuum to generate refrigerant vapor and droplets of concentrated solution. Since the changeover valve is open during heating operation, the mixture of refrigerant vapor and concentrated solution flows directly into the evaporator. Some refrigerant vapor flows through the condenser before reaching the evaporator.

Evaporator

Hot refrigerant vapor condenses on the surface of the evaporator coil and heat, equivalent to the latent heat of the refrigerant, is transferred to the hot water circuit. The recirculating hot water is heated to 131°F. Refrigerant liquid mixes with concentrated lithium bromide solution and the resulting dilute solution returns to the generator where the cycle is repeated.

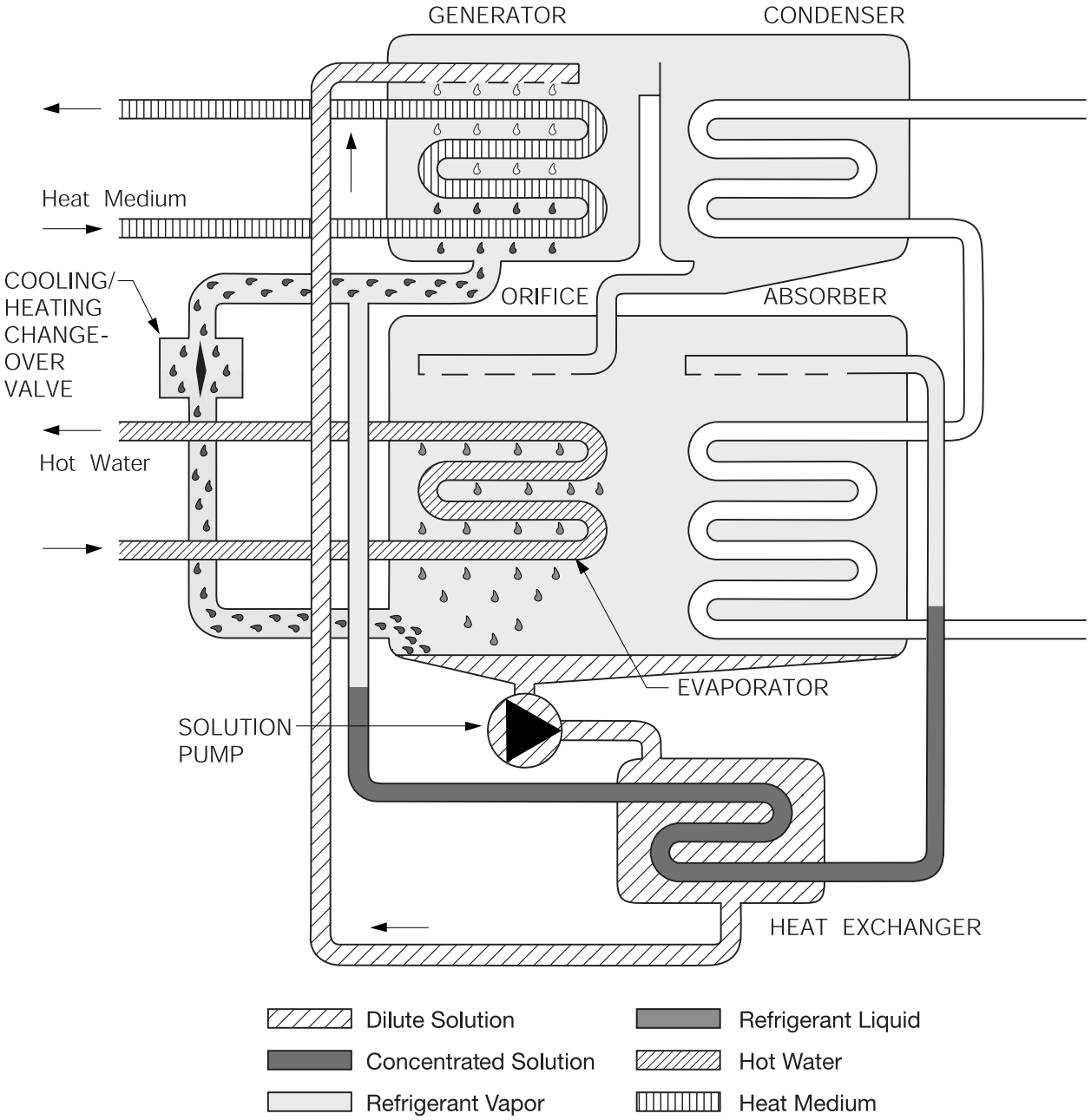


Fig.2 SINGLE-EFFECT ABSORPTION CYCLE (HEATING)

CONTROLS

GENERAL INFORMATION

A control panel, shown in Fig. 3, is built into each absorption chiller or chiller-heater and is located on the control box, behind the front panel as shown in Fig. 4. After inspecting the control panel or changing the mode of operation, make sure that the front panel is replaced and secured with screws to prevent rain from entering the cabinet and unauthorized tampering with the controls.

The chiller or chiller-heater may also be supervised and controlled by external control systems when the necessary interconnections are installed. Additional controls and interlocks can be explained by your Authorized Yazaki Service Provider.

Once COOLING or HEATING operation is selected and the unit is started, the chiller or chiller-heater will function automatically and remain in operation as long as there is a demand for chilled water or hot water. The heat medium pump or bypass valve is cycled ON and OFF to control flow of heat medium through the generator in response to the chilled/hot water temperature. When the chilled water temperature is satisfied, the solution is automatically diluted and the cooling water pump is stopped after 4 minutes.

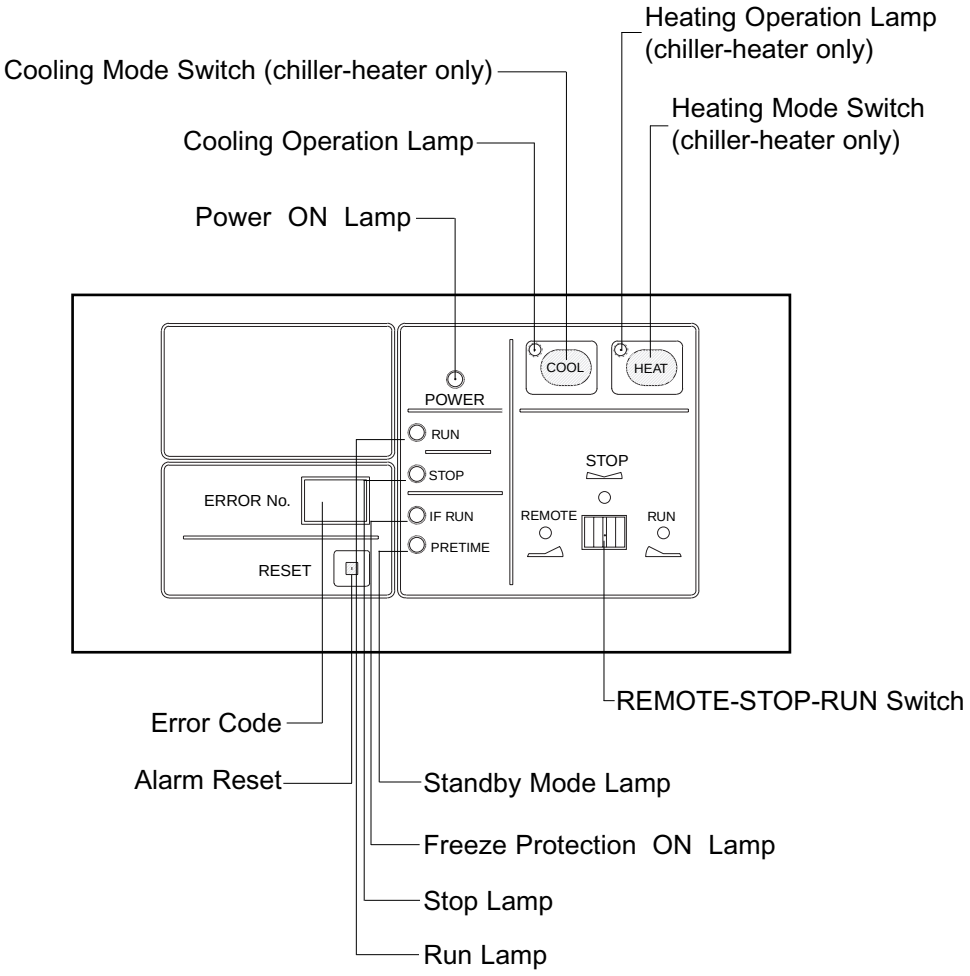
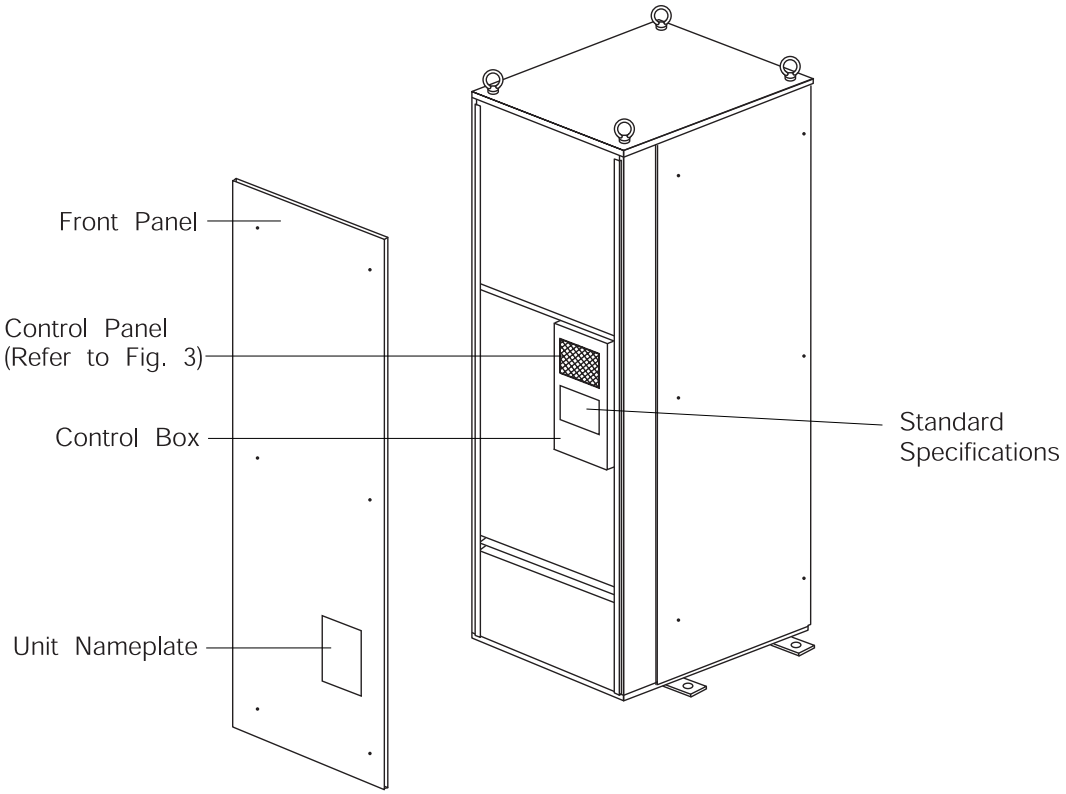
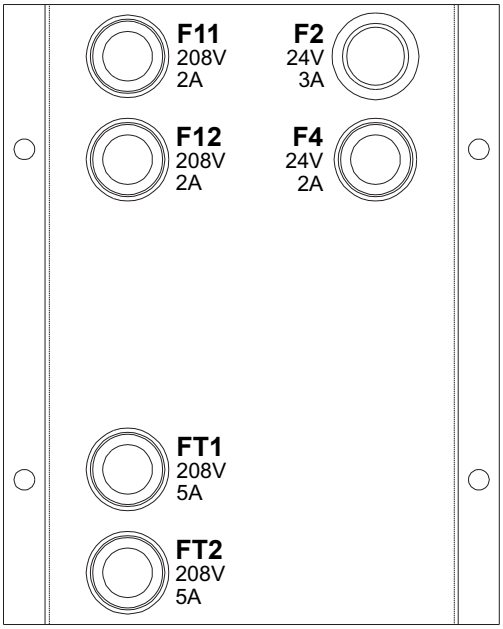


Fig.3 CONTROL PANEL



Chiller or Chiller-Heater

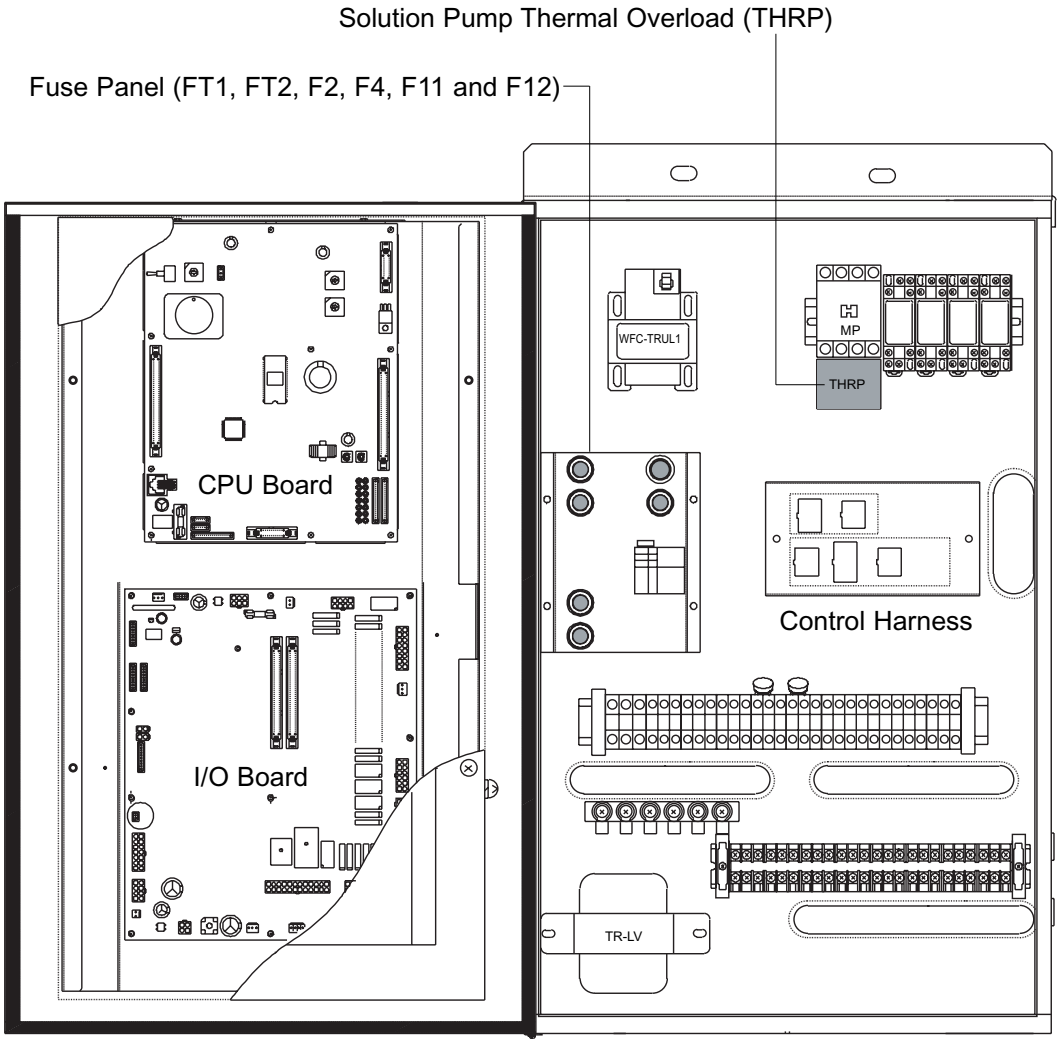


Fuse Panel

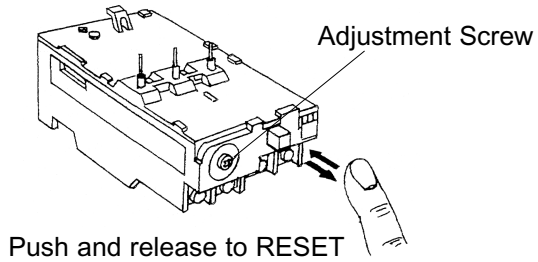
REPLACEMENT FUSES		
SYMBOL	**RATING**	**TYPE**
FT1, FT2	5A	Fuji Model FGAO-2 rated 250V AC
F11, F12	2A	
F4	2A	
F2	3A	Bussmann Model GLQ-3, GMQ-3 or GMQ-3$^{2/10}$

Fuses must be replaced with the same model and rating. DO NOT USE a substitute.

Fig. 4 LOCATION OF CONTROLS



Control Box



Solution Pump Thermal Overload

SOLUTION PUMP THERMAL OVERLOAD SETTINGS (A)		
MODEL	**SYMBOL**	**208V**
WFC-SC10 WFC-SH10	THRP	0.4
WFC-SC20 WFC-SH20	THRP	0.7
WFC-SC30 WFC-SH30	THRP	2.0

The 208V, 60Hz, 3 ph. power supply must be within voltage tolerances of +10% and -5%.

CAUTION

FOR YOUR SAFETY DO NOT TOUCH ANY LIVE ELECTRICAL PARTS. ELECTRIC SHOCK CAN CAUSE INJURY OR DEATH.

Fig. 4 LOCATION OF CONTROLS

CONTROL ADJUSTMENTS

The leaving chilled water and hot water temperature controls are set at the factory to the Standard Specifications shown in Fig. 5. Your Authorized Yazaki Service Provider can adjust the setpoints with the ACT-3 maintenance checker to accommodate step control on multiple units or satisfy alternative design temperatures, however, the differential is fixed. The standard factory setpoints are adjustable from 59.9°F to 41.9°F (leaving chilled water) and 122.9°F to 140.9°F (leaving hot water).

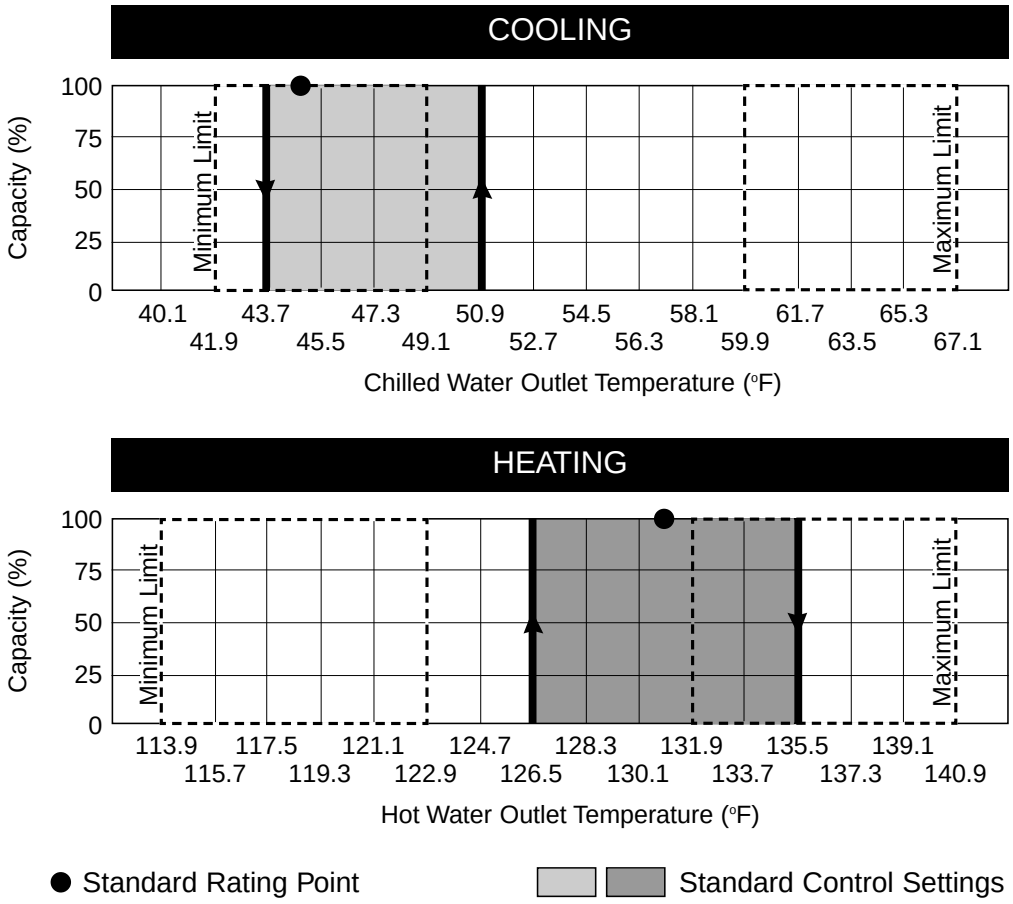
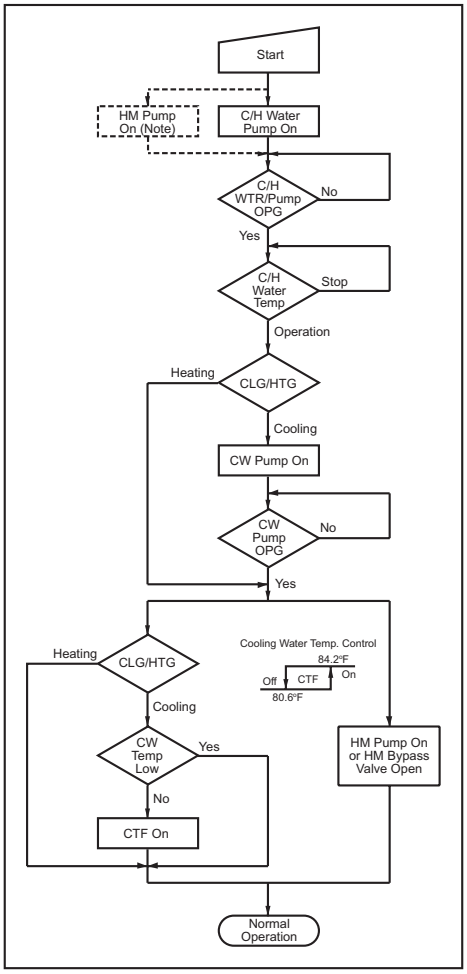


Fig. 5 TEMPERATURE CONTROL ADJUSTMENTS

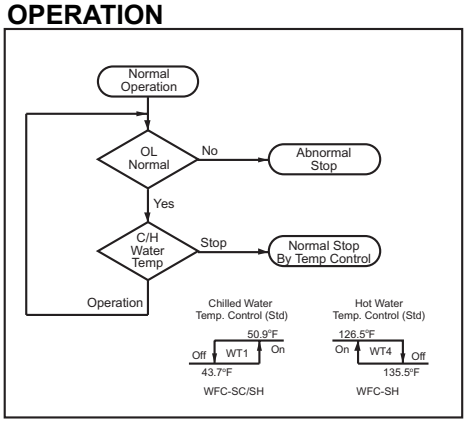
CONTROL SEQUENCE

A built in microprocessor in the chiller or chiller-heater controls the external pumps and heat medium bypass valve (if installed) in response to the cooling and heating load. The operating sequence of each pump and the cooling tower fan after start-up, during normal operation and after a normal stop or abnormal shutdown is shown in Fig. 6. It is important that the chiller or chiller-heater have control over the pumps to allow for controlled shutdown under normal and abnormal conditions.

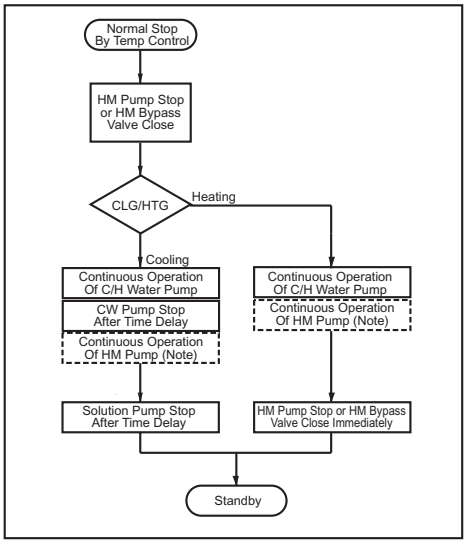
START-UP



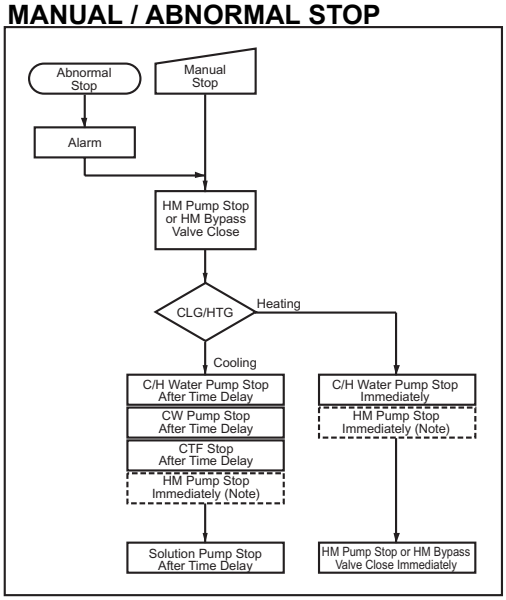
OPERATION



NORMAL STOP


Normal Stop By Temp Control
HM Pump Stop or HM Bypass Valve Close
CLG/HTG
Heating
Cooling
Continuous Operation Of C/H Water Pump
CW Pump Stop After Time Delay
Continuous Operation Of HM Pump (Note)
Continuous Operation Of C/H Water Pump
Continuous Operation Of HM Pump (Note)
Solution Pump Stop After Time Delay
HM Pump Stop or HM Bypass Valve Close Immediately
Standby

MANUAL / ABNORMAL STOP


Abnormal Stop
Manual Stop
Alarm
HM Pump Stop or HM Bypass Valve Close
CLG/HTG
Heating
Cooling
C/H Water Pump Stop After Time Delay
CW Pump Stop After Time Delay
CTF Stop After Time Delay
HM Pump Stop Immediately (Note)
C/H Water Pump Stop Immediately
HM Pump Stop Immediately (Note)
Solution Pump Stop After Time Delay
HM Pump Stop or HM Bypass Valve Close Immediately

LEGEND

C/H:	Chilled/Hot
WTR:	Water
OPG:	Operating
TEMP:	Temperature
CLG:	Cooling
HTG:	Heating
CW:	Cooling Water
CTF:	Cooling Tower Fan
HM:	Heat Medium
OL:	Motor Overload

NOTE: Optional control of HM PUMP when HM BYPASS VALVE installed to control heat input.

Fig. 6 CONTROL SEQUENCE

OPERATION

COOLING

1. Select STOP on the REMOTE-STOP-RUN switch to stop heating operation. (If currently operating in the heating mode.)
2. Push COOLING on the control panel to select cooling mode. (Automatic selection on chillers.)
3. Select RUN on the REMOTE-STOP-RUN switch to start cooling operation. (Cooling operation will commence 30 minutes after heating operation is stopped.)

REMOTE CONTROL

Select REMOTE on the REMOTE-STOP-RUN switch to allow external controls to start, stop and select the chiller-heater operating mode. (When REMOTE is selected the control panel is disabled.)

SAFETY CONTROLS

Safety/limit controls monitor critical operating conditions in the chiller or chiller-heater and shutdown the unit when abnormal conditions occur. An Error Code that designates the cause of the shutdown, shown in Table 2, is displayed on the control panel. When the abnormal condition has cleared, push the Alarm Reset to restart cooling or heating operation. If the chiller or chiller-heater does not restart, contact your Authorized Yazaki Service Provider.

HEATING

1. Select STOP on the REMOTE-STOP-RUN switch to stop cooling operation. (If currently operating in the cooling mode.)
2. Push HEATING on the control panel to select heating mode.
3. Select RUN on the REMOTE-STOP-RUN switch to start heating operation. (Heating operation will commence 30 minutes after cooling operation is stopped.)

WINTER SHUTDOWN

If a chiller-heater is only used in the cooling mode and shutdown for the winter, operate the chiller-heater for 30 minutes in the heating mode to dilute the working fluids. Proceed with winterizing the cooling tower and cooling water circuit.

PRECAUTIONS

1. Ensure that all AUTO-OFF-MANUAL switches for external pumps and the cooling tower fan are set in the AUTO position during normal operation. (The chiller or chiller-heater is designed to automatically control the chilled/hot water pump, cooling water pump, heat medium pump and/or heat medium bypass valve.)
2. At the beginning of the cooling season clean and refill the cooling tower with fresh water.
3. During the heating season the cooling tower and cooling water circuit should be drained to avoid freezing and scaling in the absorber and condenser of the chiller/chiller-heater.
4. When two or more absorption chiller-heater modules are installed in parallel, set all units for the same operating mode.

MAINTENANCE

GENERAL INFORMATION

ALL MAINTENANCE SHOULD BE PERFORMED BY SKILLED, EXPERIENCED PERSONNEL. Your Authorized Yazaki Service Provider can help you establish a standard maintenance procedure.

For your safety, keep the area around the equipment clear and free of combustible materials, gasoline and other flammable substances. DO NOT obstruct service access to the equipment.

ROUTINE MAINTENANCE

Routine maintenance should be provided throughout the life of the equipment to ensure satisfactory operation and performance.

During the warranty period, an Authorized Yazaki Service Provider must be engaged to provide routine maintenance on chillers at the beginning of each cooling season (spring changeover) and, on chiller-heaters at the beginning of each cooling season (spring changeover) and heating season (fall changeover). When the chiller or chiller-heater is used for process cooling or heavy load operation it may be necessary to schedule additional service visits to evacuate noncondensible gases from the vacuum section. The following routine maintenance checks and adjustments are normally performed on the chiller or chiller-heater:

Spring Changeover (Cooling Operation of Chiller/Chiller-Heater)

1. Evacuate noncondensible gases from the vacuum section.
2. Measure and adjust (if necessary) the chilled water, cooling water and heat medium flows.
3. Check the function of the chilled/hot water flow switch.
4. Measure the absorption cycle temperatures and verify that they are normal.
5. Measure the inlet and outlet chilled water, cooling water and heat medium temperatures.
6. Check the mounting level of the chiller or chiller-heater.
7. Measure the power supply voltage in each phase.
8. Inspect the cooling tower and cooling water circuit. (Note the condition of the cooling water and effectiveness of the water treatment provided.)
9. General inspection of the chiller cabinet and components.

Fall Changeover (Heating Operation of Chiller-Heater)

1. Evacuate noncondensible gases when the evaporator is less than 90°F.
2. Measure and adjust (if necessary) the hot water and heat medium flow.
3. Check the function of the chilled/hot water flow switch.
4. Measure all temperatures around the chiller-heater (including the inlet and outlet hot water and heat medium temperatures) and verify that they are normal.
5. Measure the power supply voltages in each phase.
6. General inspection of the chiller-heater cabinet and components

WINTERIZING

When the equipment is located outdoors in climates subject to freezing, cooling water must be drained from the chiller/chiller-heater, piping and cooling tower at the end of the cooling season. Use glycol of adequate concentration in the chilled/hot water and heat medium circuits to prevent freeze damage. The glycol will reduce the cooling and heating capacity but this may be offset by increasing the circuit flow. If in doubt about potential freeze damage in your area, discuss it with your Authorized Yazaki Service Provider. Remember, damage to the chiller or chiller-heater due to freezing is not covered by the product warranty.

WATER QUALITY

It is the Owner/End User's responsibility to have the cooling water analyzed and chemically treated (as often as necessary) so that it conforms to the limits specified in Table 1. The water quality in the chilled/hot water, cooling water, and heat medium circuits shall not exceed the following limits:

	ITEM	CHILLED/ HOT WATER	HEAT MEDIUM	COOLING WATER	MAKE-UP WATER
Standard	pH (at 77°F)	6.8 - 8.0	7.0 - 8.0	6.5 - 8.2	6.8 - 8.0
	Conductivity (μS/cm at 77°F)	400	300	800	300
	Chloride ion (Cl^- ppm)	50	30	200	50
	Sulfate ion (SO_4^{2-} ppm)	50	30	200	50
	M-alkalinity ($CaCO_3$ ppm)	50	50	100	50
	Total hardness ($CaCO_3$ ppm)	70	70	200*	70
	Calcium hardness ($CaCO_3$ ppm)	50	50	150	50
	Ionic Silica (SiO_2 ppm)	30	30	50	30
Reference	Total iron (Fe ppm)	1.0	1.0	1.0	0.3
	Copper (Cu ppm)	1.0	1.0	0.3	0.1
	Sulfide ion (S^{2-} ppm)	ND	ND	ND	ND
	Ammonium ion (NH_4^+ ppm)	1.0	0.1	1.0	0.1
	Residual chlorine (Cl ppm)	0.3	0.1	0.3	0.3
	Free carbon dioxide (CO_2 ppm)	4.0	0.4	4.0	4.0
	Ryzner stability index			6.0 - 7.0	

NOTES:
1. ND (Not Detectable)
2. *Maximum total hardness of make-up water shall not exceed 70 ppm when bleed off is the only method used to control water quality.

Table 1 WATER QUALITY REQUIREMENTS

TROUBLESHOOTING GUIDE

SYMPTOM: Chiller/chiller-heater does not operate

POSSIBLE CAUSE	REMEDY
Power supply is disconnected	Check the power ON lamp. If it is OFF check that the main disconnect is closed and the line fuses are in good condition.
Solution pump overload relay tripped	Check for Error Code E08 on the control panel. If this error code is displayed, first push the manual Reset button on the overload relay and then push the Alarm Reset on the control panel.
Manual reset device is tripped	Check the Error Code on the control panel and identify the fault from Table 2. After the cause is eliminated, push the Alarm Reset.
High heat medium inlet temperature	Check for Error Code E38 on the control panel. If this error code is displayed, push the Alarm Reset on the control panel after the heat medium inlet temperature falls below 190.4°F.
Fuse has melted	Check the condition of each fuse in the control box and replace as necessary.

SYMPTOM: Poor cooling capacity

POSSIBLE CAUSE	REMEDY
Poor vacuum	Evacuate noncondensible gases from the vacuum section through service valves A and B.
Low heat medium inlet temperature	Check the heat medium inlet temperature. Increase the temperature if it is below the original design conditions (max. 203°F).
High cooling water inlet temperature	Check for Error Code E37 on the control panel. If this error code is displayed, push the Alarm Reset on the control panel after the cause is eliminated.
Low cooling water flow	Check for flow restrictions in the strainer and piping.
Fouling in the condenser and absorber	Measure the temperature difference between the condenser surface and the cooling water outlet (LTD). If LTD is greater than 7°F, with a good vacuum and correct cooling water flow, the condenser and absorber tubes are fouled and should be chemically cleaned.

NOTE: If the chiller or chiller-heater does not operate as expected after checking the above remedies, contact your Authorized Yazaki Service Provider for further assistance.

ERROR CODES

ERROR CODE	DESCRIPTION	REMARKS
E01	Remote monitoring system power supply interrupted	NA
E02	Remote monitoring system communication wire short circuit or reverse connection	NA
E03	Remote monitoring system communication line noise	NA
E04	ST2 Interlock open circuit (optional field wiring connection)	Immediate shutdown. Manual reset required after repair.
E05	P1 (chilled/hot water pump) overload relay tripped	
E06	P2 (cooling water pump) overload relay tripped	
E07	CT (cooling tower fan) overload relay tripped	
E08	SP (solution pump) overload relay tripped	
E09-E12	NA	
E13	WTO (chilled/hot water temperature sensor) wire open or short circuit	Immediate shutdown when open circuit (<14.4°F) or short circuit (>193.6°F) detected. Automatic reset after repair.
E14-E26	NA	
E27	FS1 (chilled/hot water flow switch) low flow	Alarm when low flow is detected for 10 min. anytime 1 min. after P1 starts. Heat input stops immediately and restarts automatically after flow restored. Continuous pump operation.
E28	FS2 (cooling water flow switch) low flow (optional field wiring connection)	Shutdown when low flow is detected for 2 sec. anytime 1 min. after P2 starts. Automatic reset after flow restored.

ERROR CODE	DESCRIPTION	REMARKS
E29-E32	NA	
E33	CTI (cooling water temperature sensor) wire open circuit	Shutdown when open circuit (<14.4°F) detected for 5 sec. anytime 10 min. after P2 starts. Automatic reset after repair (>39.2°F).
E34-E36	NA	
E37	High cooling water inlet temperature	Shutdown when high temp. exceeds 95°F for 5 sec. anytime 3 min. after P2 starts. Manual reset required after cause eliminated.
E38	High heat medium inlet temperature	Shutdown when high temp. exceeds 204.8°F for 5 sec. Manual reset required after temp. falls below 190.4°F.
E39-E42	NA	
E43	Low cooling water inlet temperature	Alarm and operation changed to standby mode when low cooling water inlet temp. falls below 46.4°F for 2 min. Cooling operation restarted and alarm automatically reset when temp. exceeds 48.2°F.
E44	Changeover valve malfunction (chiller-heater only)	Shutdown when changeover valve does not open (HON) or close (CON) within 22 sec. Manual reset required after cause eliminated.
E45-E46	NA	
E47	HWT (heat medium temperature sensor) wire short circuit	Shutdown when short circuit (>239.0°F) detected for 5 sec. Automatic reset after repair (<230.0°F).
E48	P3 (heat medium pump) overload relay tripped	Immediate shutdown. Manual reset required after repair.
E49	High evaporator temperature	Shutdown when evaporator temp. exceeds 68°F for 20 min. and heat medium inlet temp. is greater than 140°F. Manual reset required after cause eliminated.
E50-E71	NA	
E72	LT (evaporator temperature sensor) wire open or short circuit	Immediate shutdown when open circuit (<14.4°F) or short circuit (>193.6°F) detected. Manual reset required after repair.
E73-E92	NA	
E93	Model setting error	Shutdown when incorrect settings of DS1 & DS3 are detected. Automatic reset after the cause eliminated.
E94	TS1 switch incorrectly set in BC or VC position	Shutdown after 30 min. when TS1 is not returned to the central position for normal operation. Manual reset required after the cause eliminated.
E95	Data error	

NOTE: NA (Not Applicable)

Table 2 ERROR CODES

WARRANTY

YAZAKI LIMITED EXPRESS WARRANTY

1. **Scope of Coverage.** The Limited Express Warranty of Yazaki Energy Systems, Inc (Company) applies to the initial retail purchaser and assigns (Customer) of Yazaki water fired chillers and chiller-heaters (Product) installed in the U.S.A., Canada and Mexico.
2. **General Express Warranties.**
   (a) The Company warrants to the Customer, that the Product shall be free from defects in materials and workmanship within a period of one (1) year (Original Warranty Period) from the time when the Product is initially placed in operation (Start-Up Date), or two (2) years from the date of manufacture, whichever expires first, and subject to the disclaimers and limitations of this Limited Express Warranty.
   (b) For liability under this Limited Express Warranty, the Customer must arrange at its own cost for annual and seasonal routine maintenance of the Product, prior to cooling operation and prior to heating operating of the Product, by a Service Provider authorized by the Company, in accordance with the Yazaki Operating and Maintenance Instructions.
3. **Disclaimer and Limitation of Express Warranties.** There are no express warranties other than those contained in this Limited Express Warranty.
4. **Warranty Registration Card.** Every new Product is accompanied by a Warranty Registration Card which must be completed, signed by an authorized representative of the Customer, and returned to the Company. This Limited Express Warranty shall not apply unless the Warranty Registration Card is fully completed and returned to the Company within thirty (30) days of the Start-Up date of the Product.
5. **Warranty Service.** All routine maintenance, parts replacement and vacuum section repairs of the Product during the Original Warranty Period must be performed by a Service Provider authorized by the Company.
6. **Remedy During Original Warranty Period.** The Company shall, at its sole discretion, repair or replace the covered Product or parts thereof which the Company shall determine upon examination to be defective or not in conformity with the Original Warranty contained herein (Defective Part), subject to the terms hereof. The Company shall supply by standard ground transportation all parts required to repair or replace any Defective Part and shall pay to the Service Provider the necessary labor charges as fixed in the Company's warranty service payment schedule in effect from time to time (Fixed Labor Charges). The Customer shall be solely responsible for all labor costs or charges in excess of the Fixed Labor Charges.
7. **Limitation of Warranty and Limitation of Remedy.** Customer's remedies shall be limited (even in the event of the Company's default of its warranty obligations or the failure of the essential purposes of this Warranty) exclusively to those provided in Section 6. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. If the limitation of liability fails the essential purpose, the Company's liability shall be expanded to the minimum extent to avoid failure of the essential purpose. Customer waives any cause of action or theory of liability including, but not limited to, those arising under contract, tort, strict liability, product liability, statutes, or otherwise except as specifically provided by the Uniform Commercial Code as modified and limited herein. The warranty periods of all replacement parts and Products shall be deemed to commence on the Start-Up Date of the original component or Product, not the installation date of the replacement part or Product, and the Company's warranty obligation hereunder shall not be extended because of such replacement.
8. **Disclaimer of Implied Warranties.** The Company DISCLAIMS ALL IMPLIED WARRANTIES (OTHER THAN GOOD TITLE) INCLUDING BUT NOT LIMITED TO THOSE OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, AND NON-INFRINGEMENT. There are no warranties which extend beyond those express warranties contained in this Limited Express Warranty. Customer affirms that it has not relied upon the Company's skill nor judgement to select or furnish Product for any particular purpose. The Company does not warrant that the Product complies with the requirements of any safety or environmental code or regulation of any federal, state, municipality or other jurisdiction beyond the specific express warranties in this Limited Express Warranty.
9. **Specific Exclusions.** In addition to all other exclusions contained in this Limited Express Warranty, the Company's warranty shall also not apply under the following circumstances:
   (a) Damage to the Product caused by an unauthorized Service Provider;
   (b) Defect in any part which is not supplied by the Company;
   (c) Installation or operation of the Product in any way not described in the applicable Yazaki Installation and Operating Instructions;
   (d) Applications for process cooling (except single-effect absorption chillers);
   (e) Failure to provide routine maintenance of the Product by a Company authorized Service Provider in accordance with the applicable Yazaki Operating and Maintenance Instructions;
   (f) Failure to maintain the quality, flow and supply temperature of cooling water in accordance with Yazaki standards and limitations;
   (g) Damage caused to the Product from freezing, overpressure and corrosion in any water circuit;
   (h) Misuse, abuse, negligence, accident, natural disaster, alteration, misapplication or experimental use of the Product;
   (i) Normal fading and minor deterioration of the cabinet surface caused by exposure to the elements;
   (j) Removal of the Product from its original installation site unless the relocation is approved in writing by the Company and performed by a Company authorized Service Provider;
   (k) Materials, such as inhibitor and batteries (if required), that are consumed during normal operation of the Product;
   (l) Damage to other products outside the Product, not supplied by the Company, caused by use of materials that are not compatible with the operating temperatures of the Product, regardless of the absence of specific instructions in Yazaki Installation and Operating Instructions.

AUTHORIZED YAZAKI SERVICE PROVIDER

For information concerning service, operation
or technical assistance, please contact your
Authorized Yazaki Service Provider or the following:

YAZAKI ENERGY SYSTEMS, INC.
701 E. PLANO PARKWAY, SUITE 305, PLANO, TEXAS
75074-6700
Phone: 469-229-5443
Fax: 469-229-5448
Email: yazaki@yazakienergy.com
Web: www.yazakienergy.com

This symbol on the product's nameplate
means it is listed by
UNDERWRITERS LABORATORIES, INC.

Yazaki reserves the right to discontinue, or change at any time,
specifications or designs without notice and without incurring obligations.

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